Seizure Problems in 250 Cerebral Palsied Adults

MARGARET H. JONES, *M.D.*, and
JOSEPH E. MASCHMEYER, *M.D.*, Los Angeles

• **Seizures occurred at some time in 81 (or 32 per cent) of an unselected, consecutive series of 250 cerebral palsied persons between the ages of 16 and 52 years, an incidence similar to that reported by other investigators in groups of cerebral palsied persons who were mainly children.**

The incidence of seizures of any kind after 16 years of age in the present series was 10 per cent as compared with 0.5 per cent in the general population. Half of the 10 per cent had more than six convulsions despite drug therapy, and the other half had fewer than six.

Of thirty-six who had convulsions in the neonatal period, only four had seizure problems as adults, even though most showed moderate to severe physical handicap after age 16.

Data on the small group of paraplegics in the present study, all spastics, were in accord with reports by other investigators with regard to decreased incidence of seizures in cerebral palsied patients with normal upper extremities. Of the thirteen (5 per cent of the 250) whose seizure problems continued to be clinically significant in adult life, ten had had frequent seizures in childhood. Eight were hemiplegic. There appeared to be no relationship between the severity of physical handicap and the incidence of seizures after age 16.

BECAUSE THE INCIDENCE of convulsions in cerebral palsied children is reported to be between 32 per cent[2] and 47 per cent,[6] review of the seizure problem in adults with cerebral palsy is important for individual and community planning for these patients. This report presents data regarding seizure problems occurring in a group of 250 cerebral palsied persons between 16 and 52 years of age. This unselected group comprises the total number evaluated at the Vocational Training Center, United Cerebral Palsy Association of Los Angeles County, between February 1954 and June 1957.

Data from the history, as given by the patient and/or his family, showed that 32 per cent (81 of the 250) had had one or more convulsions. No attempt has been made in this report to differentiate the types of seizures other than to indicate any known focal elements, as the histories were not detailed enough to give this information accurately. The group consisted of 158 males and 92 females; of these, 53 males and 28 females gave a history of seizures.

For the purpose of this study, patients were divided into groups according to age at occurrence of convulsions as shown in Table 1.

Approximately one-third (26) of the 81 who had had convulsions at some time during childhood continued to have a seizure problem after 16 years of age. In no case did seizures begin after 16 years of age.

In reviewing the group whose seizures occurred in the neonatal period only (Table 2) it was noted that there were abnormal natal factors in all but one case. Abnormal natal factors included a history of trauma, respiratory difficulty, neonatal limpness or rigidity, and other findings which appeared to be of sufficient significance to suggest central nervous system damage.

Despite the fact that seizures occurred only during the neonatal period, sixteen of the eighteen patients later showed moderate to severe quadriplegic physical involvement. Only one was born prematurely.

From the Department of Pediatrics, University of California at Los Angeles, and the Department of Physical Medicine and Rehabilitation, College of Medical Evangelists, Los Angeles.

Presented before the Section on Physical Medicine at the 87th Annual Session of the California Medical Association, Los Angeles, April 27 to 30, 1958.

TABLE 1.—*Data on Continuance of Epileptic Seizures in a Group of Cerebral Palsied Adults Who Had Had Seizures Before Age 16*

	Number of Patients
Seizures before Age 16 years	81
I. Before 16 years of age only	55
Neonatal only	18
Birth to 6 years	25
Birth to 16 years	12
II. Continued after 16 years of age	26
Occasional seizures	13
Many seizures	13

Table 3 shows that, excluding those with seizures in the neonatal period only, twenty-five reported no fits after the first six years of life.

In the patients who had seizures between birth and six years of age (Table 3), the proportion considered to have had abnormal natal factors (14 of 25) was a little more than half, compared with 92 per cent in the group with seizures limited to the

TABLE 2.—*Patients with Seizures Limited to Neonatal Period (Birth to One Month)*

(Total number, 18)

	Incidence
Cause:	
Prenatal factors	0
Natal factors	17
Postnatal factors	1
Unknown	0
Extent of handicap:	
Paraplegia	1
Hemiplegia	1
Triplegia	0
Quadriplegia	16
Severity of physical handicap:	
Mild	2
Moderate	8
Severe	8

TABLE 3.—*Patients with No Seizures After Six Years (Excluding Those with Neonatal Seizures Only)*

(Total number, 25)

	Incidence
Cause:	
Prenatal factors	1
Natal factors	14
Postnatal factors	4
Unknown	6
Extent of physical handicap:	
Paraplegia	2
Hemiplegia	2
Triplegia	3
Quadriplegia	18
Severity of physical handicap:	
Mild	7
Moderate	11
Severe	7
Number of seizures:	
Few*	24
Many*	1

*Few = Fewer than six. Many = Six or more.

TABLE 4.—*Patients 16 Years of Age and Over with Seizures, Not Including Those Whose Seizures Ceased by 6 Years of Age*

(Total number, 12)

	Incidence
Cause:	
Prenatal factors	1
Natal factors	8
Postnatal factors	0
Unknown	3
Extent of physical handicap:	
Paraplegia	0
Hemiplegia	1
Triplegia	0
Quadriplegia	11
Severity of physical handicap:	
Mild	2
Moderate	5
Severe	5
Number of seizures:	
Few*	6
Many	6

*Fewer than six seizures.

neonatal period. Again quadriplegics predominated with roughly equal numbers being mildly, moderately and severely involved physically. Convulsions usually occurred infrequently, and often were associated with a febrile illness. They were focal in one patient only. Thirty-six per cent of the patients in this group were born prematurely. Premature birth occurred more often in this group than in any other (nine of a total of seventeen prematures in this series), and most of the very small prematures were included in it.

Omitting the groups with seizures in the neonatal period only and also those whose seizures ceased by age six, twelve patients reported convulsions continuing to some period between six and sixteen years (Table 4). Natal abnormality was noted in the majority, and the entire group appeared to have had damage of the central nervous system from the time of birth. None had illness or accident after birth as a causative factor. All but one were quadriplegic, and ten were moderately or severely involved physically. Half were estimated to have had more than six seizures. Again a small proportion, three of the twelve, had seizures in the neonatal period. Three were born prematurely.

Of the patients reporting only occasional convulsions after 16 years of age (Table 5), half had a history of some abnormality during the natal period; ten of the thirteen probably were affected from birth. None had been born prematurely. Five were hemiplegic, a proportion greater than in any of the preceding groups, although the majority had all four extremities affected. Most were moderately involved physically. Four, or approximately one-third, reported focal episodes, and over one-half had more than six seizures. Of these, three had them frequently in childhood.

Of those having many seizures either with or without medication after 16 years of age (Table 6), about half appeared to have had natal abnormalities or were thought to have had central nervous system damage from birth. Three of the thirteen were born prematurely. Many were hemiplegic and moderately involved physically. The number of cases judged due to postnatal causes, five of thirteen, was proportionately greater than in any of the other groups. No paraplegics in this series had seizures after 16 years of age. In this group, those with natal and postnatal etiological factors, ten of thirteen, had very many seizures in childhood. Only one person in this group had neonatal seizures. In all patients convulsions were a continuing problem, rather than one that had not begun until adult life. In seven of the thirteen the seizures were thought to be focal.

TABLE 5.—*Patients with Occasional Seizures Continuing After Age 16*

(Total number, 13)

	Incidence
Cause:	
Prenatal factors	0
Natal factors	7
Postnatal factors	2
Unknown (present from birth, 3)	4
Extent of physical handicap:	
Paraplegia	0
Hemiplegia	5
Triplegia	0
Quadriplegia	8
Severity of physical handicap:	
Mild	4
Moderate	8
Severe	1
Number of seizures:	
Few	5
Many (but only occasional after 16 years)	8

TABLE 6.—*Patients with Many Seizures Continuing After Age 16*

(Total number, 13)

	Incidence
Cause:	
Prenatal factors	1
Natal factors	5
Postnatal factors	5
Unknown (present from birth, 1)	2
Extent of physical handicap:	
Paraplegia	0
Hemiplegia	8
Triplegia	2
Quadriplegia	3
Severity of physical handicap:	
Mild	1
Moderate	9
Severe	3
Number of seizures:	
Few	0
Many	13

TABLE 7.—*Seizures Correlated with Causes in Two Groups of Cerebral Palsied Adults, One with Seizures Ending Before Age 16, the Other with Continuing Seizures*

Etiology	Group I Seizures Under 16 Years Only	Group II Seizures Continuing After 16 Years
Prenatal factors	2	1
Natal factors	39	12
Postnatal factors	5	7
Unknown	9	6
Totals	55 (focal, 5)	26 (focal, 7)

TABLE 8.—*Seizures Correlated with Extent of Physical Handicap in Two Groups of Cerebral Palsied Adults, One with No Seizures After Age 16, the Other with Continuing Seizures*

Extent of Physical Handicap	Group I Seizures Under 16 Years Only	Group II Seizures Continuing After 16 Years	
Paraplegia	3	0	
Hemiplegia	4	13	
Triplegia	3	2	
Quadriplegia	45	11	
Totals	55	26	81

Comparing the group having seizures only before 16 years of age (Group I, Table 7) with the group whose seizures continued after 16 years (Group II), suggests certain trends. Relating seizure incidence to possible cause of the central nervous system damage, we find natal abnormality in 39 of 55 (70 per cent) in Group I, and in 12 of 26 (46 per cent) in Group II. Group II shows a proportionately greater number with postnatal factors than Group I; focal seizures appeared to be more frequent in Group II also; the incidence was 5 of 55 in Group I and 7 of 26 in Group II.

The topographical distribution of physical handicap (Table 8) shows no paraplegics in the second group, and a considerable increase in the proportion of hemiplegics in Group II. Of the seventeen hemiplegics, twelve reported natal problems as a possible etiological factor, and five were thought to result from illness or accident in the postnatal period. The high proportion of quadriplegics in the first as compared with the second group is noteworthy.

The severity of the physical handicap did not vary widely in the two groups (Table 9). There were relatively more seizures in childhood than in adult life in the group having severe physical involvement. Thus the disabling factor in these severely involved cerebral palsied adults was more often due to the physical handicap than to the convulsive problem.

Table 10 indicates the difference in the incidence of seizures for each clinical type of cerebral palsy in the two groups. In the group with convulsions continuing after age 16 years, there was a decided preponderance of spastics (18 of 26), and thirteen of the eighteen spastics in this group were hemiplegics. Of patients showing some form of abnormal motion (athetosis, rigidity, tremor, etc.), the majority (28 of 33) had convulsions during childhood only.

DISCUSSION

According to Brain,[1] the incidence of epilepsy in the general population is 0.5 per cent. He noted Patrick's and Levy's report of infantile convulsions occurring in 4 per cent of normal children. Thom[8] reported a 7 per cent incidence. That is, one child in every 14 to 25 has a seizure at some time, as compared with one adult in every 200.

The incidence of convulsions at one time or an-

TABLE 9.—*Seizures Correlated with Severity of Physical Handicap in Two Groups of Cerebral Palsied Adults, One with No Seizures After Age 16, the Other with Continuing Seizures*

Severity of Physical Handicap	Group I Seizures Under 16 Years Only	Group II Seizures Continuing After 16 Years	
Mild	11	5	
Moderate	24	17	
Severe	20	4	
Totals	55	26	81

TABLE 10.—*Incidence of Clinical Types of Cerebral Palsy in Two Groups of Cerebral Palsied Adults, One with Seizures Before Age 16 Only, the Other with Continuing Seizures*

Clinical Type	Group I Seizures Under 16 Years Only	Group II Seizures Continuing After 16 Years	Total
Spastic	22	18	40
Dyskinetic	28	5	33
Ataxic	0	0	0
Others	5	3	8
Totals	55	26	81

TABLE 11.—*Incidence of Seizures After Age 16 Correlated with Degree of Physical Handicap (250 Cerebral Palsied Adults)*

Degree of Physical Handicap	Total Number	Number Having Seizures After Age 16
Mild	65	5
Moderate	117	17
Severe	40	4
Unclassified	28	0
Totals	250	26

other in the group of cerebral palsied adults in this study (32 per cent) was lower than the 47 per cent incidence reported by Perlstein, Gibbs and Gibbs[6] in a series of 1,500 cerebral palsied patients, aged three months to 20 years, but was close to the 35 per cent noted by Wishik.[9]

If the ratio of child to adult incidence of seizures in cerebral palsied persons were the same as that reported in the general population (namely 0.5 per cent in adults against 4 to 7 per cent in children), one would expect, statistically, that 2.3 to 4 per cent of the 250 adults in this study would have had seizures after 16 years of age; the actual incidence was 10 per cent, half having only occasional seizures and half having many poorly controlled convulsions.

Perlstein, Gibbs and Gibbs suggested that this relatively greater persistence of seizures into adult life among the cerebral palsied persons as compared with unselected epileptics is due in part to the much higher incidence of petit mal in unselected epileptics (50 per cent) than in cerebral palsied (1.6 per cent) and the tendency for petit mal to disappear after adolescence. Studies of the electroencephalographic patterns in this series of 250 cerebral palsied adults are currently being carried out. These studies to date indicate a very low incidence of petit mal. Unfortunately, the histories available are not sufficient to serve as a basis for clinical diagnosis of type of seizures. The majority of those with many seizures after age 16 had frequent seizures in childhood.

Penfield and Jasper[5] said that "convulsive seizures which occur during the acute reactions to operative or traumatic brain lesions are of little significance with regard to the future development of habitual seizures." In this series, only four of thirty-six having neonatal convulsions reported episodes at a later date, whereas many of those having neonatal abnormality without neonatal convulsions did have episodes later. Could this indicate that seizures *per se* in the neonatal period are of little prognostic significance as to the problem of epilepsy later in life? They may be of considerable importance as an indication of later physical abnormality, since most of the patients in this series who had only neonatal seizures were later found to be moderately to severely physically handicapped.

Brain[1] cited Patrick and Levy's data that 40 per cent of epileptics had a history of "infantile convulsions." In 12 of the 26 epileptic cerebral palsied adults in the present study, the onset of seizures was under age six.

Perlstein and Hood[7] found 43 per cent of 334 infantile spastic hemiplegics to have seizures. In the present series, seventeen of the forty hemiplegics had such episodes, a similar proportion. Of these seventeen, thirteen continued to have a seizure problem after 16 years of age. In four of the thirteen cases the seizures were due to postnatal causes.

Merritt[3] said, "The frequency of convulsive seizures in organic diseases of the central nervous system is not directly related to the severity or degree of cerebral damage." This view appears to be confirmed in the present series, as shown in Table 11. Seizure problems did not appear related to the severity of the physical handicap.

On comparing the characteristics of this group of 250 adults with 1,287 cerebral palsied children seen at three cerebral palsy diagnostic clinics in Los Angeles County,[4] it was found that the patients in the two series were very similar as to type, degree and extent of physical handicap, incidence of seizures and intelligence. Therefore, this unselected series of 250 adults can be said to be roughly comparable to the child population seen at diagnostic clinics in Los Angeles County.

5201 Beverly Boulevard, Los Angeles 4 (Jones).

REFERENCES

1. Brain, Sir Russell: Diseases of the Nervous System, Oxford University Press, 1956, p. 899.

2. Jones, M. H., and Maschmeyer, J. E.: Childhood aims and adult accomplishments in cerebral palsy, Internat. Rec. of Med., 171:4, April 1958.

3. Merritt, H. H.: A Textbook of Neurology, Lea & Febiger, Philadelphia, Pa., 1955.

4. Ogg, H. L.: A Survey of 1287 Cerebral Palsied Patients in the Los Angeles Area, University of Southern California, 1953.

5. Penfield, W., and Jasper, H.: Epilepsy and the Functional Anatomy of the Human Brain, Little, Brown & Co., Boston, Mass., 1954.

6. Perlstein, M. A., Gibbs, E. L., and Gibbs, F. A.: The electroencephalogram in infant cerebral palsy, Amer. J. Phys. Med., 34:4, 1955.

7. Perlstein, M. A., and Hood, P.: Infantile spastic hemiplegia, Amer. J. Phys. Med., 34:3, 1955.

8. Thom, D. A.: Convulsions in early life and their relation to chronic convulsive disorders and mental defects, Amer. J. Psychiat., 98:4, 579, Jan. 1942.

9. Wishik, S. M.: An outline for the community cerebral palsy program, Amer. J. Public Health, 44:2, 1954.

For Your Patients—A number of specialists have asked that a slight copy change be made in Message No. 1. This has been done and now Message No. 1A is available as well as Message No. 1.

A Personal Message to YOU:

I consider it both a privilege and a matter of duty to be available in case of an emergency. However, you can understand that there are times when I may not be on call. I might be at a medical meeting outside the city, on a bit of a vacation—or even ill.

Consequently, I thought it would be a good precaution if—on this gummed paper which you can paste in your telephone book or in your medicine cabinet—I listed numbers where I can be reached at all times. Also, the number of a capable associate as an added service. Here they are:

_____	_____	_____
OFFICE	HOME	MY DOCTOR
_____	_____	_____
OFFICE	HOME	ASSOCIATE DOCTOR

Sincerely,

_____, M.D.

MESSAGE NO. 1A. Attractive, postcard-size leaflets printed on gummed paper, you to fill in telephone numbers and your signature. Available in any quantity, at no charge, as another service to CMA members. Please order by Message Number from CMA, PR Department, 450 Sutter, San Francisco.